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The Bush Budget for '91

Defense, Big Science Retain Hold on R&D Funds

The budget that President Bush sent to Congress this week reflects a modest shift from military toward civilian research, but in an era of expanding Japanese high-tech industrial imperialism and receding Soviet power, it still pigheadedly consigns the bulk of the money to military programs.

The new budget would further entrench monumentalism—big space, big physics, big biology—as the prime theme in civilian research policy. Assuming acceptance by Congress, which has more or less tagged along in the past, the budget would take only token steps toward correcting the neglect of so-called little science and the academic research base. And, with the Administration still undecided about how to help foundering American industries, the budget reflects a hodgepodge of existing activities, mainly under the auspices of the Pentagon, but few new ones in the civilian R&D agencies.

Following a tradition that dates back to the Kennedy

Verbatim from the Budget Briefing By Bush's Science Adviser—Page 3

Administration, Bush's Science Adviser, D. Allan Bromley, met with the press on budget-delivery day, January 29, to discuss the R&D section. In keeping with the style of that rite, he was joyous about the numbers. "We have here, in a difficult budget year," Bromley cheerfully announced, "a budget document relating to research and development that is an excellent one. I am delighted to be able to present it to you." Bromley added that he was especially pleased by "the substantial increase in the civilian component of the federal R&D," a sector eviscerated in the Reagan rearmament program.

Under Washington's budget-scoring system—in which the measure of success is simply "How much more than last year?"—the gross numbers in the proposed budget are indeed impressive. For fiscal 1991, which begins next October 1, Bush is asking Congress for a total of \$71.2 billion in budget authority for military and civilian R&D programs, an increase of about \$4.5 billion, or 7 percent, over the present figure. The additional money is a reasonably safe cushion against the anticipated inflation rate of about 5 percent, and, in general, there's at least a little more for all the clients of federal R&D. Bromley, out of Yale, stressed that basic research, distributed throughout various federal agencies, is budgeted for an increase of 8 percent, and now comprises about 18 percent of all federal R&D spending.

The details of the budget, however, do not reflect the

new world of economics and national security that confronts the United States. Thus, the proposed budget would give defense \$41.4 billion, or 61 percent of all federal R&D funds. In dollars, that's actually an R&D increase of \$1.5 billion for defense, which, contrary to the impression fostered by the Bush Administration, isn't going down; it's only going up slower than in the recent past.

Where there is a decline for defense is in its *share* of the federal government's R&D spending. For over a decade pre-Reagan, a roughly 50-50 split prevailed between civilian and military shares of federal R&D spending. Under Reagan—who accelerated a design that originated with Carter—the military share of federal R&D rose to an official 69 percent in 1986, though by some reckonings, it was sub-

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In Brief

Responding to Congressional mystification and unease over how all that federal basic research money is disbursed to academe, the Office of Technology Assessment has undertaken a major study. Requested by the House Science, Space, and Technology Committee, the study will "outline options for Congress to craft mechanisms, to make choices, and to encourage creativity and productivity" in basic research.

The OTA project has been strongly endorsed by Senator Charles E. Grassley (R-Iowa), who has expressed "special concern over the peer/merit review system, and various reported problems, abuses and shortcomings in this system." Scheduled for completion in February 1991, the study is headed by Daryl E. Chubin, an OTA Senior Analyst.

The newly expanded NIH panel that's supposed to lay to rest the marathon Baltimore case is scheduled to meet February 10-11 on the NIH campus, where the inhouse staff has been assembling data and conducting interviews. Margot O'Toole, who set off the controversy by citing errors in a paper co-authored by Nobelist David Baltimore, has been interviewed twice. New on the panel are Stewart Sell, University of Texas, and William McClure, Mellon Institute, Pittsburgh.

Rep. John Dingell's investigation of the case has spawned various hostile interpretations, of which the most inventive is by MIT biologist Jonathan King, who wrote in the November MIT Faculty Newsletter: "The investigation of Baltimore can be most readily understood as the first salvo in the effort by some in Congress to shrink the NIH and related programs, in order to protect other sectors from cuts, the largest of which is the DOD budget." Trouble is, investigator Dingell is invariably a strong backer of more money for NIH.

... Big Projects Absorb Most of the Budget Growth

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stantially higher than that. Since then, the Pentagon's R&D budget has been slowly declining, falling to 61 percent in the new Bush budget.

But even the reduced figure is strikingly high in relation to military R&D spending by the countries that are overwhelming the US in high-tech markets. Japan spends about 2 percent of its government R&D funds on defense; for West Germany, it's about 12 percent. The percentage comparisons are not wholly relevant, but they are revealing of

The big book, *Budget of the United States Government: Fiscal Year 1991* (GPO Stock No. 041-001-00349-5, 1569 pp., \$38), devotes two chapters to R&D: "Expanding the Human Frontier—Space and Biotechnology, and the Superconducting Supercollider" and "Enhancing Research and Development," plus numerous tables specifying the amounts sought for R&D agencies and their various programs. Order from: USGPO, Superintendent of Documents, Washington, DC 20402-9325; tel. 202/783-3238.

national priorities.

What also stands out in the R&D accounts is that the proposed growth of \$4.5 billion for next year would be largely absorbed by an added \$2 billion for NASA and the \$1.5 billion increase proposed for defense R&D. NASA is the big gainer in the President's budget, with a 24 percent increase that would raise its budget authority next fiscal year to \$15.2 billion. Within that sum, the space station budget would rise by \$700 million, to a total of \$2.6 billion. NASA would also expand a variety of programs that are now germinating at low financial levels, including further exploration of Bush's proposed Moon-and-Mars program, which would increase by 47 percent, to \$408 million.

The politically significant element in these relatively small amounts for new space ventures is that they are downpayments on programs that would eventually require colossal budgets. The present startup money is planting constituencies of contractors and other beneficiaries that have no counterparts in the politics of small science.

Thus, the National Science Foundation, regularly the beneficiary of Washington's kindest words for science, is budgeted a \$300 million share of the proposed growth in overall federal R&D spending. For NSF that works out to a 14 percent increase. That's healthy in percentage terms, but it still leaves NSF in the bush leagues of federal R&D spending. For example, the NSF budget includes only \$20 million for university research facilities (along with another \$20 million appropriated for this year). But the unmet backlog for new university laboratories and renovations is estimated to be many billions of dollars. The budget for NSF's Science and Engineering Education Directorate goes up by 22 percent, to \$251 million. But given the horror stories about the state of science education, the sum is

minuscule, even if one takes at face value the Administration claim that many other federal agencies are devoting great sums to the cause.

Similarly, the Department of Agriculture's competitive grants research program is budgeted to double—to all of \$100 million a year, Congress willing, which it usually isn't when confronted by attempts to put more emphasis on competition in the award of USDA research money. The ultimate goal is a \$500 million competitive program, as recommended by the National Academy of Sciences last year.

Meanwhile, in contrast to these frugalities, the Superconducting Super Collider (SSC) is budgeted for \$318 million next year, a 46 percent increase, with even bigger ones to come as the mammoth venture proceeds. The SSC's dirty little secret of impending, boundless cost overruns is out of the bag, despite the ironclad assurances of fealty to budget that its wily promoters gave to the Reagan Administration and Congress. Now, as can be seen in the accompanying press briefing with White House Science Adviser Bromley (P. 6), a one- or two-billion overrun is accepted as just routine in such matters.

Another contrast between the rich and the poor, the chosen and the neglected, of federal R&D is to be seen in the budget fate of the National Institute of Standards and Technology (NIST), rechristened as such two years ago from the old National Bureau of Standards to assist federal-industrial research collaboration in the new era of global competition. The new role was designed by Congress, over the opposition of the Reagan Administration, which preferred to run industrial policy through the Pentagon, which regularly spends several billion dollars a year on industrial rejuvenation.

NIST, in the meantime, has been given a few crumbs for its new industrial role, but no more. The new Bush budget provides \$10 million for an "Advanced Technology Program to support a number of consortia doing generic, pre-competitive research into promising technologies." In addition, there's \$5 million for NIST's fledgling program of Regional

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From Bromley's Briefing on the 1991 R&D Budget

Following are verbatim chunks from the Q&A portion of White House Science Adviser D. Allan Bromley's press briefing, January 29, on the Administration's fiscal 1991 R&D budgets. The tone is generally congratulatory, as befits a Presidential representative, but woven in, too, are many clues about R&D policy processes and thinking in the Bush White House.

On the budget's limited funding for the proposed national supercomputer network:

"There is additional funding for the high-performance computer initiative, but not anything like the funding that was outlined in the OSTP document [see *The Federal High-Performance Computing Program*, SGR In Print, October 1, 1989]. The reason for that is simply that we [OSTP] completed that study very late in the '91 budget cycle, and as I indicated earlier, under the FCCSET (Federal Coordinating Council for Science, Engineering, and Technology, an inter-agency appendage of OSTP) structure, during this coming year, we will attempt to put together a coherent, integrated national program. . . ."

On the Administration's commitment to so-called mega-projects:

"We are committed to a number of these major projects. In the case of the SSC, this Administration continues [the policy] of the previous one, and the funding that we have requested, \$319 million this year, is sufficient to allow us to remain on the 10-year time line that was initially proposed. The work during this coming year will be focused particularly on getting reliable, industrially producible magnets,

because we require that we have some 10,000 of those superconducting magnets working at extremely high reliability.

"The Space Station Freedom is now at the stage where our budget proposes that we have funding to work with our international collaborators in actual phases of design and beginning construction. Though that program has slipped since it was first initiated, our intention here is now to move that forward on the time line that we have discussed and that we believe makes sense.

"In the genome area, where we have a very effective cooperation between NIH and the Department of Energy, it is our intention to move that forward.

"In some other areas, other major projects, we have not been able to move forward as rapidly as proponents would have wished. The National Aerospace Plane, for example, is one of those. The Compact Ignition Tokamak is another. And we have a series of such projects that are moving forward, but not at the rate that had been hoped for.

"I should emphasize that there are certain projects that I think are particularly important to demonstrating to our international collaborators that we, in fact, are reliable partners. There has been considerable question as to whether we were reliable partners or not. And, for example, in the ITER [International Thermonuclear Experimental Reactor] Program that involves ourselves, the Soviets, Japan, and Western Europe, we have made certain that our funding is at the level expected by our collaborators, and this project is moving forward effectively."

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Budget

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Manufacturing Technology Centers, which are intended to "transfer advanced manufacturing technologies to medium and small-size businesses."

An interesting contrast is Sematech, a research consortium of 14 semi-conductor manufacturers, for which the Pentagon provides \$100 million a year. The latest official word, after several leaked reports about a cutoff of Sematech, is that DOD will continue the subsidy.

The budget request for NIH calls for a customarily modest increase—from \$7.5 billion to \$7.9 billion—in anticipation of Congress looking after its most favored research agency. But, with its funding rate for approved applications now below 30 percent, NIH needs a great deal more money than friends on Capitol Hill usually provide. The scale of need is so great that it can be met only by a combined White House-Congressional push. But NIH spends most of its extra-mural billions on small science, and though Bromley, along with many other chiefs of research, regularly extols solo and small-group research as the engine of American scientific creativity, the Bush budget falls short

for getting NIH out of its fiscal doldrums.

Budget day brought the usual comments from commentators and politicians that the Presidential spending plan was "dead on arrival," etc., on Capitol Hill. For R&D, however, the reality is that the budgets that come out of the appropriations process usually bear a close resemblance to the budgets that went in. Adjustments are made on the margins—and these can be painful or beneficial for those most directly affected. But the changes, in fact, tend to be small. The NSF budget, for instance, will neither be doubled nor halved by Congress, but will probably end up close to the sum sought by the Administration.

The same goes for all those mega-projects. By coincidence of technological and political developments, they're all emerging from infancy at about the same time. With no political restraints on their progress, they'll be reaching multi-billion-dollar adolescence at a time when the federal budget is likely to be under even more pressure than at present.

In famines, armed men are the last to go hungry. The guardians of small science should remember that as the politically powerful mega-projects increase their appetites in the age of Gramm-Rudman-Hollings.—DSG

... Concern Over Funding for Young Scientists

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On support for high-temperature superconductivity research:

"What we had was \$525 million in fiscal 1990, and we are up to \$537 million in 1991. This is one of those programs where we [OSTP] came in very late in the fiscal-year 1991 budget cycle, and it is my anticipation that in the '92 budget cycle, we will be in a position to have a more specific impact on the budget decisions. Depending upon how the development proceeds, we will be able to respond. Right at the moment, what we need most of all in terms of high-temperature superconductivity are some fundamental discoveries having to do with increasing the critical current densities that are possible and improving the formability of these high-temperature superconductors. We are at the moment limited by our understanding and by the specific technology."

On Administration policy for government-industry cooperation on high-tech research:

"It is the intent of this Administration not to become involved in an industrial policy where we in the federal government would attempt to pick winners and losers in the industrial sector. Frankly, we don't think we're capable of doing that as well as the private sector itself. On the other hand, in what I would call technology policy, I believe that we have a very real role in that spectrum of activities that goes from the basic research, where we clearly have a unique federal role, all the way through the applications research, the development of technology, up to the pre-competitive phase.

"We are competing in an increasingly competitive and hostile international marketplace. And it simply does not make sense for us to require our industrial participants to each reinvent the wheel in terms of the underlying generic technologies that are going to make them competitive in a world market. I believe that we in the federal government have a very real role to play in bringing such private-sector organizations together, in capitalizing consortia—in, where appropriate, seeding those consortia with federal support to develop the kind of technology whose benefit can't perhaps be captured in any short time period by any given industry, but yet is critically important to a broad spectrum of both our economic competitiveness and to our national security.

"I have every intention that we will be involved and we will be involved aggressively in this area. It is for that reason, for example, that for the first time, my office has an Associate Director for Industrial Technology [William Phillips, a veteran of industrial research, most recently President of the Missouri Advanced Technology Institute, now awaiting Senate confirmation]. It will be our intent to work very closely with other agencies in the Administration—the Department of Commerce, in particular—and with the Congress in making some of this possible; if you like, in leveling the playing field in high-technology areas for our US partici-

pants."

On the danger of mega-projects hurting finance for "small science":

"The commitment was made when we decided to move forward on the SSC and a number of other major projects that they would not move forward unless two provisos were satisfied. The first was that they not be carried out at the expense of the base program that involves single and small-group investigator research that I happen to believe still is the backbone of American science and technology. I have carefully checked—my colleagues and I have been very vigilant about this—to be sure that isn't happening. And I can assure you that the base programs have not suffered.

"However, all of you, I know, have heard the quite understandable complaints, for example, from young scientists who are distressed that the fraction of the excellent proposals coming in to NSF and NIH [which receive support] is going down. That's a very unfortunate development, because it sends a message to these young people just at a time when this nation requires more of them casting their career decisions into areas of science and technology.

"So, what then is the problem? In a sense, those of us in the scientific community—and I was part of that [at Yale University, where Bromley was Professor of Physics] until recently—built part of this problem for ourselves. For years, we complained about one-year grants and contracts. We wanted multi-year grants and contracts and we argued that "sophistication inflation" is real, that each year, to address the frontier problems, you require additional funding compared to the year behind. Now, both NSF and NIH responded to those complaints and recommendations. [David] Packard [co-founder of Hewlett-Packard] and I made recommendations specifically in that direction [as advisers to OSTP during the Reagan Administration]. We urged multi-year funding. We urged larger grants and contracts to make it possible for people to address the problems of greatest interest to them.

"In responding to those recommendations and to those requests from the research community, both agencies have built themselves substantial out-year "mortgages." And it is those out-year mortgages that are causing much of the problem today. Another part of the problem is that, right now, 87 percent of all the scientists and engineers who have ever lived and worked are living today and working, whereas less than 4 percent of the population that has ever lived is alive today. This is a demographic problem. And despite the fact that we are increasing the funding for this individual investigator research, those increases are not keeping pace with the demographic increase and therefore the demand for funding for new young scientists seeking support. This is a very serious problem. It's one that we will be addressing during this coming year. All I can say is that both I and my colleagues view this as a matter of serious concern."

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... Fund Shortage Spawns Pork-Barrel Pressures

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On the role of the "peace dividend" in the expanded R&D budget:

"I do not see the treatment that science and technology received in this budget as really in any way reflecting the so-called peace dividend, because, quite frankly, I don't think there is very much of a peace dividend available, particularly this year. I do believe that science and technology will continue to be well treated within the confines of our budget preparation, because in the coming years, my office will be

Two booklets providing budget and program details on major interagency federal research programs were released this week in accompaniment to the President's 1991 budget:

Our Changing Planet: The FY 1991 US Global Change Research Program (60 pp., no charge), a report by the Committee on Earth Sciences, which was organized by the White House Science Office, chaired by Dallas Peck, Director, US Geological Survey. Order from: USGS, 104 National Center, Reston, Va. 22092; tel. 703/648-4450.

Arctic Oceans Research: Strategy for an FY 1991 US Program (41 pp., no charge), report by an interagency committee chaired by NSF Director Erich Bloch. Order from: NSF, Division of Polar Programs, 1800 G St. NW, Washington, DC 20550; tel. 202/357-7817.

working more closely with the agencies and with OMB. We've worked out an excellent working relationship with Mr. [Richard] Darman [Director of the Office of Management and Budget] and his colleagues, and I think we will be able to make more effective cases for the support of science and technology than we did perhaps even this year. And I also think the most important thing of all is the fact that the President himself believes deeply that the support of science and technology is one of the most effective investments that we can make on behalf of the taxpayer."

On the inadequacy of federal funds for constructing and renovating university research facilities:

"The universities must bear significant responsibility for what has happened here. Having experienced something like seven or eight years of 20-percent-per-year growth [in the 1960s], the universities were loath to recognize that the conditions had changed. And so for a period of at least a decade . . . of increased belt tightening, the universities assumed that if they could hold together for one more year, they could protect their most important resource, their people, by deferring maintenance, by not providing for amortization of equipment, buildings, and so on. And this whole deferral has now come home to roost.

"The magnitude of the problem is one that's generally agreed on. It will require about \$10 billion over a 10-year period. I think almost everyone agrees that the appropriate way to handle this would be for a 50-50 sharing between the federal government and private sources. The goal here is to bring the universities back to a state of infrastructure well-

being, so that from thereon in, they would be expected to be self-sustaining. We have to arrange so that the use charges that are paid for research in university facilities and on the equipment being used are such that, if properly managed, they could thereafter take care of modernization, maintenance and so on. There is a catchup problem, however. Now unfortunately, this year, in the balancing of the demands of various areas in the budget, again, this was an area that did not fare as well as some would certainly have hoped.

"It is also an area where the Congress had an informal agreement a year ago that over the next few years, that particular component of the budget would be held at something like \$20 million. The situation is serious, the problem is real, and it is one that we will eventually have to address. We were not able to do it this year. . . .

"I feel that it is particularly important that we address this question soon, because in the absence of a concrete, forward-looking program that would resolve the problem, more and more of our universities are resorting to purely political channels to obtain the funding. And that bypassing of the peer-review system that has served us exceedingly well in the postwar years augurs very badly for our research and technology base and the strength of our enterprise. So, there is strong pressure on all of us in the Administration and in the Congress to get on with this problem. But unfortunately, this year it simply was one that we were not able to take up."

On the role of the Defense Department in basic research:

"The basic research in the Defense Department is going to go up at 5.9 percent, compared to 1.7 percent for the Defense Department as a whole. This is critically important, because this is just the time, the time of reduced tensions, when we as a nation have to be extraordinarily careful that we are protecting ourselves in the national-security arena from the possibility of technological surprises, from the possibility of being blind-sided with major scientific or technological breakthroughs.

"Quite beyond that—and this is something I have discussed with [Defense] Secretary Cheney and Deputy Secretary Atwood—is that it is extraordinarily important in this country for the Defense Department and the academic community to rebuild some of the bridges that were present in the immediate postwar decades. This was extremely important, both for the Defense Department and for the universities, because it brought the Defense Department into contact with some of the brightest minds in the country and most particularly into contact with some of the brightest young people. At the same time, it supported the development of the new knowledge and the training of the young minds that were able to use that knowledge creatively in the universities and very much to the benefit of the Defense Department.

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... Bromley Says No Surprise in SSC Cost Boost

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"Quite apart from the specific national security needs, there is a very strong case to be made for improving the relationships between the research community and the Defense Department."

On encouraging industrial research:

"One of the ways of handling that will be not only to request making permanent the Research and Experimentation Tax Credit [which the last Congress reduced and extended only to the end of 1990], but also extending it to 100 percent, and also making it possible for our multi-nationals to bring back credit for research and experimentation that they do outside of the US.

"Beyond that, one of the very important areas that the Administration is working on is that of eliminating—already the legislation is in place—much of the antitrust inhibition to cooperation. Despite that, there is a 'ghost' remnant of the antitrust legislation that remains in place. And corporations of all sizes are reluctant sometimes to engage in cooperative activity because they're not exactly sure how the antitrust legislation might be applied to them, or whether it might return. One of the things this Administration is committed to is to making it clear that we recognize that we are now dealing in an international rather than a national marketplace, and that therefore our antitrust legislation has to be tailored to reflect that change. And we have to convince people that we in fact mean business and that this is a whole new playing field."

On the industrial role of the Department of Commerce and the National Institute for Standards and Technology (NIST):

"My office is very interested in making common cause with the Department of Commerce. We have been discussing a number of issues with Secretary Mosbacher and Deputy Secretary Murrin. I believe that there are a number of areas where we can build upon the relationships that have already been established between NIST and the private sector. In particular, now that my office [will soon have] an Associate Director for Industrial Technology, we look forward to a much closer relationship with the Department of Commerce. There is a new position in Commerce, the Under Secretary for Technology. That position is in the process of being filled at this moment by a very distinguished individual [Robert White, formerly of Control Data, whose nomination has not yet been announced]."

On further changes in the Defense share of federal R&D:

"I do see a decline in the development, the 'D' part of Defense R&D, and I will do everything I can to see an increase in the 'R' part, because the basic research aspect of the Defense Department's activities are extremely important. They complement the work elsewhere. But given today's world, it is inevitable that the Defense Department budget will not see growth in the future. Obviously, the

R&D component of the Defense Department is vulnerable under those conditions because the other major areas in the Defense Department where budget reductions are possible—the closing of military bases or the termination of major weapon-systems programs—are situations where very effective local constituencies can be brought to bear. And so it is going to require stalwart behavior on the part of the leaders of the Defense Department, with all the help that we can provide, to make sure that the basic part of the research and the more fundamental applied activity continue to grow. I have been assured by both Secretary Cheney and by Deputy Secretary Atwood that they fully support that point of view. I am optimistic that we will be able to maintain the 'R' part but not the 'D'."

On the effect that cost increases may have on support for the Superconducting Super Collider:

"We all knew that the initial cost estimate for the SSC was based on a conceptual design study. Now that [SSC Laboratory] Director [Roy] Schwitters has pulled together his own team, and we have some of the world's best accelerator-design engineers and scientists working on this design, they have taken the conceptual design and are in the process of turning it into a final design with all the bells and whistles. It does not come as a great surprise to anyone who has worked around large accelerators or large projects that when you move from the conceptual design study to the actual design study that there are almost inevitable price increases.

"It is obvious, however, that if those price increases continue, and if they become excessive, then, of course, the whole question of whether the Congress will find it possible to continue its support is one that will be open for discussion. It is our intent in the Administration to follow through, to make this the best possible research device that we can. It is our intent to try to hold the cost within reasonable bounds. I am quite confident that we can do it."

NAS Sets Reorganization

Having swelled to some 200 committees, the Commission on Physical Sciences, Mathematics, and Resources at the National Academy of Sciences (NAS) is to be "disestablished" and replaced by two bodies: The Commission on Physical Sciences, Mathematics, and their Applications, and the Commission on Geosciences, Environment, and Resources. Norman Metzger, now NAS Deputy Executive Officer, will be Executive Director of the first, with Norman Hackerman, a senior member of the establishment, as Chairman; Stephen Rattien, now Deputy Executive Officer of the Commission on Engineering and Technical Systems, will head the second new Commission, for which a Chairman has not yet been selected. The reorganization, first recommended in 1982, signifies a speedup of internal management at the NAS.

State Dept. Official Picked for No. 2 Post at NSF

Frederick M. Bernthal, a Reagan Administration hold-over in the post of Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, is to be nominated for Deputy Director of the National Science Foundation, the White House has announced. He would succeed **John H. Moore**, who left January 1 to head George Mason University's new International Institute.

The appointment of Bernthal to the No. 2 NSF post is of more than routine interest, given the expiration next August of NSF Director **Erich Bloch's** six-year appointment. (Bloch stepped up to the Directorship from NSF's No. 2 spot.) Bernthal, a physics PhD from UC Berkeley, held various academic posts before joining the staff of Senator Howard Baker (R-Tenn.) in 1979. He was a Commissioner of the Nuclear Regulatory Commission when he was appointed to the State Department post in 1988.

James B. Snow Jr. has been appointed Director of the NIH National Institute on Deafness and Other Communication Disorders, succeeding **Jay Moskowitz**, NIH Associate Director for Science Policy and Legislation, who had held the post on an acting basis since 1988, when the institute was created. Snow is Chairman of the Department of Otorhinolaryngology and Human Communication at the University of Pennsylvania School of Medicine.

Edward J. Stemmler, Dean emeritus of the University of Pennsylvania Medical Center, has been appointed Executive Vice President of the Association of American Medical

Colleges, the Washington-based lobby for medical education. The appointment is effective in July. He succeeds **John F. Sherman**, who will serve as a consultant to the AAMC.

Rep. Doug Walgren (D-Pa.) is stepping down as Chairman of the House Subcommittee on Science, Research, and Technology, part of the Science, Space, and Technology Committee (SS&T), to take the Chairmanship of the Energy and Commerce Subcommittee on Commerce, Consumer Protection, and Competitiveness, vacated by the election of Rep. Jim Florio to Governor of New Jersey. The move reflects the great power of Energy and Commerce, chaired by Rep. John Dingell, relative to the middling status of the SS&T Committee.

Walgren will be succeeded by **Rep. Tim Valentine** (D-NC), who now chairs the SS&T Subcommittee on Transportation, Aviation and Materials. Likely to leave SS&T, but not yet, is **Rep. Bill Nelson**, Chairman of the Space Science and Applications Subcommittee, who's considered a shoo-in for the Democratic nomination for Governor of Florida.

Also at the SS&T Committee, **Harold P. Hanson**, Executive Director since 1980, has retired, but will be on hand part-time as a consultant. A successor has not been named.

Sverker Hogberg, former Science Counselor at the Swedish Embassy in Washington, is serving there in the newly created post of Counselor for Environmental Technology.

And at West Germany's Washington Embassy, **Klaus E. Schroeter** has been appointed Counselor for Scientific and Technological Affairs, succeeding **Heinz Seipel**, who has returned to Bonn.

Carol Rogers, Head of the Office of Communications and its predecessors at the American Association for the Advancement of Science since 1976, has resigned to pursue other interests, but will continue to serve in a consultant capacity through the AAAS annual meeting, February 15-20, in New Orleans.

In Print

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ments at some 730 US institutions, organized by school, discipline, sources of fellowship support, etc.

Order from: NSF, Science and Engineering Sector Studies Group, Room L-611, 1800 G St. NW, Washington, DC 20550, attn: J. G. Huckenpahler; tel. 202/634-6082. Included in the publication are instructions for obtaining the data on diskettes, tapes, and via electronic bulletin board.

Shortchanging Education: How US Spending on Grades K-12 Lags Behind Other Industrial Nations (29 pp., \$2), by M. Edith Rasell and Lawrence Mishel, of the Economic Policy Institute, a liberal think tank, disputes the Reagan-Bush claim that US public elementary and secondary education are well financed in comparison to other nations. In terms of share of gross domestic product and purchasing power, the report states, the US is an embarrassing laggard. International comparisons, the authors say, are distorted by heavy US spending on higher education. The report has evoked a foaming reaction from US Education Secretary Lauro F. Cavazos, whose chief, the self-styled "Education President," told the "Education Summit" last fall that the US "lavishes unsurpassed resources" on public education.

Order from: Economic Policy Institute, 1730 Rhode Island Ave. NW, Suite 812, Washington, DC 20036; tel. 202/775-8810.

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State Technology Programs: A Preliminary Analysis of Lessons Learned (73 pp., \$10), from the Council of State Policy & Planning Agencies (consisting of senior staff of state governors), looks critically at the many state and federally assisted programs established in recent years for economy-boosting purposes. Cited among "major flaws": Spending on research parks and buildings to the neglect of "intellectual infrastructure" and lack of "strategic audits" for assessing effectiveness. The report also states that "Few states are working aggressively to change the culture of academia. The most popular technology program model, the industry-university research center, appears seriously flawed. In most programs, academia is clearly in the driver's seat, and business is not intimately involved in defining the research agenda." The report was written by David Osborne, a journalist and Council Associate.

Order from: Council of State Policy and Planning Agencies, 400 N. Capitol St., Suite 285, Washington, DC 20001; tel. 202/624-5386.

Critical Connections: Communication for the Future (GPO Stock No. 052-003-01143-3, 395 pp., \$17; summary free), a major study by the Congressional Office of Technology Assessment (OTA) on direction, control, and effects of rapidly changing communications technologies, requested by the Chairman of the House Energy and Commerce Committee, John D. Dingell (D-Mich.), a great power on Capitol Hill. OTA warns that "New technologies are challenging traditional regulatory criteria, magnifying the confusion and inconsistencies that surround first amendment rights, and dismantling the traditional definition of universal service." The report adds that political access to public attention "may become increasingly dependent upon the ability to pay" and that "cultural opportunities afforded by new communications technologies will not be realized without further government involvement in the structural changes

in the communications industry."

Order the full publication from: USGPO, Superintendent of Documents, Washington, DC 20402; tel. 202/783-3238. The free summary is available from: Office of Technology Assessment, US Congress, Washington, DC 20510-8025; tel. 202/224-8996.

Human Embryo Laboratories (GAO/HRD-90-24, 37 pp., no charge), by the General Accounting Office, the Congressional investigative service, in response to a request from Rep. Ron Wyden (D-Ore.), House Committee on Small Business, presents data on staff qualifications, techniques, reported success rates, etc. at facilities offering in vitro fertilization and gamete intrafallopian transfer. The report is based on 198 responses to questionnaires sent to 254 facility directors.

Also from GAO: **Unauthorized Access to a NASA Scientific Network** (GAO/IMTEC-90-2, 17 pp., no charge), report to Chairman Robert A. Roe (D-NJ), House Science, Space, and Technology Committee, says that "unauthorized users successfully gained access dozens of times" to NASA's Space Physics Analysis Network (SPAN) between 1981-89. However, no damage has been found by NASA, GAO notes, and the trespassing on the unclassified, widely used computer network has apparently not involved "destructive intent." If there's a problem here, it does not seem to be of great concern to NASA. GAO reports that some protective measures have been taken, but "NASA has not performed a risk analysis, as required by federal and NASA directives, to ensure its actions—completed and planned—provide adequate security protection for SPAN."

Order from: GAO, PO Box 6015, Gaithersburg, Md. 20877; tel. 202/275-6241.

Selected Data on Graduate Science/Engineering Students and Postdoctorates: Fall 1988 (25 tables, plus supplemental material, no charge), NSF's annual series presenting the latest data on enrollments in 10,300 graduate departments. (Continued on Page 7)

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